University of Gondar

College of medicine and health science

Institute of public health

Knowledge, Attitude and Utilization of Information Communication Technologies (ICTs) among Health Professionals at University of Gondar Comprehensive Specialized Hospital, Northwest Ethiopia 2017

By: - Temesgen Belay

Advisors: - **Mr. Solomon Assefa (BSc, MPH)**

Mr. Kassahun Dessie (BSc, MPH)

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By Temesgen Belay

E-mail temesgenbelay95@yahoo.com

Approved by examining board_____ _____

Head, institute of public health

Advisors

1. **Mr. Solomon Assefa (BSc, MPH)** _____
2. **Mr. Kassahun Dessie (BSc, MPH)** _____

_____ _____

Internal Examiner

_____ _____

External Examiner

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ACRONYMS

- AOR - Adjusted odds ratio
- CI - Confidence interval
- COR - Crude odd ratio
- e-Health - Electronic health
- EMR - Electronic Medical Record
- ETB - Ethiopian Total birr
- FMOH - Federal Ministry Of Health
- HIS - Hospital Information System
- ICT - Information Communication Technology.
- IS - Information System
- IT - Information Technology
- PC - Personal Computer
- SPSS - Statistical Product and Service Solution
- UGCSH - university of Gondar comprehensive specialized hospital
- UOG - University Of Gondar
- WHO - World Health Organization
- WWW - World Wide Web

ABSTRACT

Introduction: - Incorporation of Information Communication Technology (ICT) in health care system has gained a great momentum of acceptance globally. Several countries are known to exploit ICT in the modernization of their health sector. Thus, ICT adoption in the health system can significantly contribute to improve quality service and accessibility. However, most health care providers in Ethiopia just like other developing countries have underprivileged ICT utilization.

Objective: To assess knowledge, attitude and utilization of Information communication technology (ICT) among health professionals at university of Gondar comprehensive specialized hospital, Northwest Ethiopia 2017.

Methods: - A cross-sectional study conducted from January to June at the University of Gondar Comprehensive Specialized Hospital. Study participants selected using simple random sampling technique. Data collected through semi-structured, self-administered questionnaire. Descriptive and logistic regression techniques employed via the help of SPSS version 20 to find out the level of knowledge, attitude and the determinants factors of utilization of information communication technology.

Result: - A total of 314 participants were enrolled in the study giving an overall response rate of 94.9%. The proportion of those who have good utilization habits for ICT was 39.9% and about 87.2%, 54.4%, were good ICT knowledge, positive attitude toward ICT respectively. Age with [AOR: 4.29, 95% CI (1.781-10.329)], educational status (AOR: 7.57, 95% CI 2.047-27.976), ICT training (AOR: 4.92, 95% CI 2.762-8.779), and ICT knowledge (AOR: 9.01, 95% CI 4.014-20.207) were found to be significantly associated with ICT utilization habits of health professionals.

Conclusions: - The result suggest that health professional's ICT utilization habit was relatively low. Age, educational status, ICT training and ICT knowledge were factors significantly associated to ICT utilization. Therefore the University of Gondar Hospital put up ICT training for healthcare in order to accrued from efficient and effective utilization of ICT.

1. INTROCUCTION

1.1. STATEMENT OF THE PROBLEM

The World Health Organization defines Information communication technology is the use of different type of computers and telecommunication facilities for gathering, storing, and disseminating information globally. e-health as the cost effective use of ICT (Information and Communications Technologies) in the support of health and health related fields including healthcare services, health surveillance, education, and research(1).

The health sector has been much less effective than many other sectors in reaping reward from the applications of ICT. Necessary hardware that includes computation devices such as computers, Laptops, Tablets, Mobiles, Printers, Scanner, and other related accessories have been made available to all levels. Software (Application): Over the years FMOH have developed various national e-health application that includes; e-HMIS, EMR, HRIS (manage/license), IFMIS, M-health, etc. Other initiatives includes LIS, hub Store IS, drug dispending, etc. Has also developed and deployed to all levels. (2).

The use of (ICTs) for healthcare delivery in the developed countries has been widely explored with most developed countries making great advances(3). Developing countries on the other hand are seeing a proliferation of e-Health pilots but few full-scale implementations(4). Some reasons given for the case of “pilot it is” in the e-Health arena in developing countries are lack of infrastructure, donor funded projects and inadequate skilled personnel to manage these e-Health projects(5).

Several countries are known to exploit ICT in the modernization of their health sector. Its specific applications include the delivery of health services in areas such as telemedicine, health sector management, database on health information, health education, etc. Information and Communication Technologies (ICTs) have the potential to make a major contribution to improving access and quality of health services(6). Improving health involves improving public health and medical programs designed to provide elective, emergency, and long-term clinical care; educating people; improving nutrition and hygiene; and providing more sanitary

living conditions. These in turn eventually involve massive social and economic changes, as many health challenges go well beyond the health sector(7). Information Communication and Technology (ICT) knowledge enables health care providers to enhance patient care delivery, as well as the practice and safety of care(9).

A major problem is that ICTs have not been widely used as tools in the health sector that advance equitable health care access. A critical mass of professional and community users of ICTs in Ethiopia has not been reached to the expected level. Health Science is dynamic in nature it has a change from time to time and it needs to be updated regarding knowledge. Health workers must constantly update themselves about new developments (in the area of treatment, on nature of various diseases) with the help of computers and the Internet(9).

The ICT access in Africa has increased immensely. As access increases, opportunities arise to leverage ICT to extend timely information and services to previously underserved populations. Besides, it helps to enhance productivity and innovation in the public and private sectors. Good instances for this case are the enhancement of people who are able to acquire mobile phone services and improvement of disease monitoring and vaccination planning and health. Even though, the dramatic improvements have been made regarding ICT, there are still significant access gaps. The new initiatives in Ethiopia, expanded implementation of e-Health is expected in the coming years, but these systems must be used effectively to meet objectives; this is entirely dependent on health professionals' use of e-Health in their daily tasks. Studies in similar settings illustrate that lack of basic knowledge on computers and software by health professionals is a main factor in failure of e-Health systems(6).

Therefore, before the costly implementation of ICTs, it is necessary to be acquainted with the current knowledge and utilization habits of health professionals. Hence, effective prior planning should be in place. As far as the researcher concerned, there exists issues that requires investigations regarding the knowledge, attitude and utilization of ICTs gaps among health professionals at University of Gondar comprehensive specialized hospital.

1.2. LITERATURE REVIEW

1.2.1. ICT Knowledge

In this ICT era, the need for health professionals to be computer literate is no longer an issue for debate. Currently using computerized medical records, retrieving patient data at a distant and accessing medical journals and literature electronically is common. Hence, acquiring basic knowledge on computer and understanding the basics of Internet among physicians is crucial(10). However, several studies in the literature suggest many health professional and health science/medical student feel that they lack computer skills and majority of them are interested in learning more about computers while attending medical school (3).

A Cross-Sectional Study conducted in Ethiopia on 554 health professionals working in 7 hospitals, 19 primary health centers, and 10 private clinics in the Harari region of Ethiopia in 2015. Out of those participants, 482 (87.0%) of them responded to the questionnaire. Among them, 90 (18.7%) demonstrated good knowledge of computers Age, field of study, level of education, and previous computer training participation found to be significantly associated with computer knowledge of health professionals (13).

A study on Knowledge and utilization of computer among health workers in Addis Ababa hospitals result shows (73.7%) respondents had good knowledge of computers while the rest (26.3%) of the respondents showed poor knowledge(8).

1.2.2. Attitude towards ICT

Health professional's intention to use ICT, their perceived pressure to utilization of ICT, their perceived control over their capacity to interact with ICT and their beliefs and expectations about the various factors. Comparatively, students in Austria, Canada, Germany, Iceland, Korea, Poland and Portugal, and the partner countries Liechtenstein, Serbia and Tunisia, express more positive attitudes towards computers, whereas students in Denmark, Finland, Hungary, Ireland and Japan, and the partner country Latvia report slightly less positive attitudes. In all countries except Japan and the partner countries Thailand and Tunisia males report more positive attitudes towards computers than do females(14). The study conducted in Ludhiana, Punjab, India in which all the nurses (100%) had positive attitude towards computers in health care setting hospital (15).

1.2.3. Utilization of ICT

Different authors identified different ICT issues in the health sectors which can directly or indirectly affect effectiveness of ICT utilization. Among the issues are legal and regulatory problems associated with ethical issues such as patient's rights of access, privacy, security, and confidentiality of patient data. On the other hand technical problems related to acceptance by the users, especially health care professionals who are ICT illiterates, hardware and software standards, interoperability, safety of the technology, institutional challenge and financial problems are the major challenges in the use of ICTs in the health sectors. Which should be taken under consideration during implementation and utilization of ICT in the healthcare organizations(11).

In the United States in1998 showed that 91% of the study subjects used computer and internet for health information and communication(16). Similar survey of medical informatics in Belgium showed that 93% of general acute care hospitals and 91% of psychiatric institutions use ICT for health practice(17,).

study conducted in Austria in 2004 showed that 75% of university students and health professionals used a ICT daily for different purpose especially for e-mail communication (94%), Internet for information research (97%) and use of word process is very common (82%) (18).

Another study also conducted in Texas for professional use, 81.4 % had used ICT technology in clinical practice. Additionally, 51.4 % of the respondents indicated no hours of instruction for professional use and 25.4 % indicated only one to six hours per day (19).

Study conducted in Nigeria use of the ICT is affects by gender and age. The percentage of males who responded to the survey was 60.5% (n = 178). The percentage of males using the Internet was 67.1% (n = 96) and the percentage of females 32.8% . No other variables practice type, location, or categories of practice such as rural or urban and solo or group practice appeared to have any impact on ICT use in the same study. Insufficient time was belief to be a primary barrier to utilization of ICT by the respondents in this study. However did not view lack of interest as a primary barrier to use of ICT(21).

Other, a case study conducted in Nigerian a University teaching Hospital in 2004. From a total of 148 participants only 59 respondents (39.9%) demonstrated good computer and internet utilization habits, while in 50 respondents (33.8%) utilization habits were average and in 39 (26.4%) they were poor(22).

The study on Utilization of Information Communication Technology (ICT) among health care providers in Kenya indicated that 88.8% of the participants did not own computers while few (11.2%) of the respondents have own computers. Only 27.6% of the respondents used computers while at work while the rest did not. Sixty one percent (61.3%) reported computers are used for patient record management, 43.5% said they are reported for sending emails, 40.3% said browsing and data storage while 35.5% said they use it for education continuation(23).

A base line study on ICT penetration and usage in Ethiopia indicated that 51% of health workers gain access to computers in their work place. Private computer centers are the second most important place (46%) and only 12% of the sampled health professionals had computer access at home of which majority of them are from Addis Ababa. It should also be realized that access to printed materials is very much limited in the health facilities, especially outside of Addis Ababa. As information is critical in the operation of health professionals every effort should be, made to improve access to computers and the Internet at the work place(23).

A study on utilization of computer among health workers in Addis Ababa hospitals, total of study participant (19.3%) were good utilizing computers, and majority of the respondents 218(80.7%) poor utilized computers. Significant predictor variables were average monthly income, job satisfaction index and own computer possession (8).

A Cross-Sectional Study conducted in the Harari region of Ethiopia on 554 health professionals working in 7 hospitals, 19 primary health centers, and 10 private clinics. Out of those participants, among them, 142 (29.5%). demonstrated good utilization habits computer. Age, field of study, level of education, and previous computer training participation found to be significantly associated with computer utilization habits of health professionals(13).

A survey conducted in Ethiopia in 2002 indicated that there are various reasons for not using computers and the Internet. But lack of access and high cost are among

the major constraining factors. 14% of non-users of computers and 20% of those not using the Internet reported lack of awareness. Given that information is critical in the operation of health professionals, every effort should to be made to improve access to computers and the Internet at the work place .It should be realized that access to printed materials is very much limited in the health facilities, especially outside the capital city(23).

1.3. CONCEPTUAL FRAMEWORK

This Conceptual framework is develop using different literature as a reference to develops my conceptual frame work five factor associated factor to the study concerns on ICT utilization of health professionals .

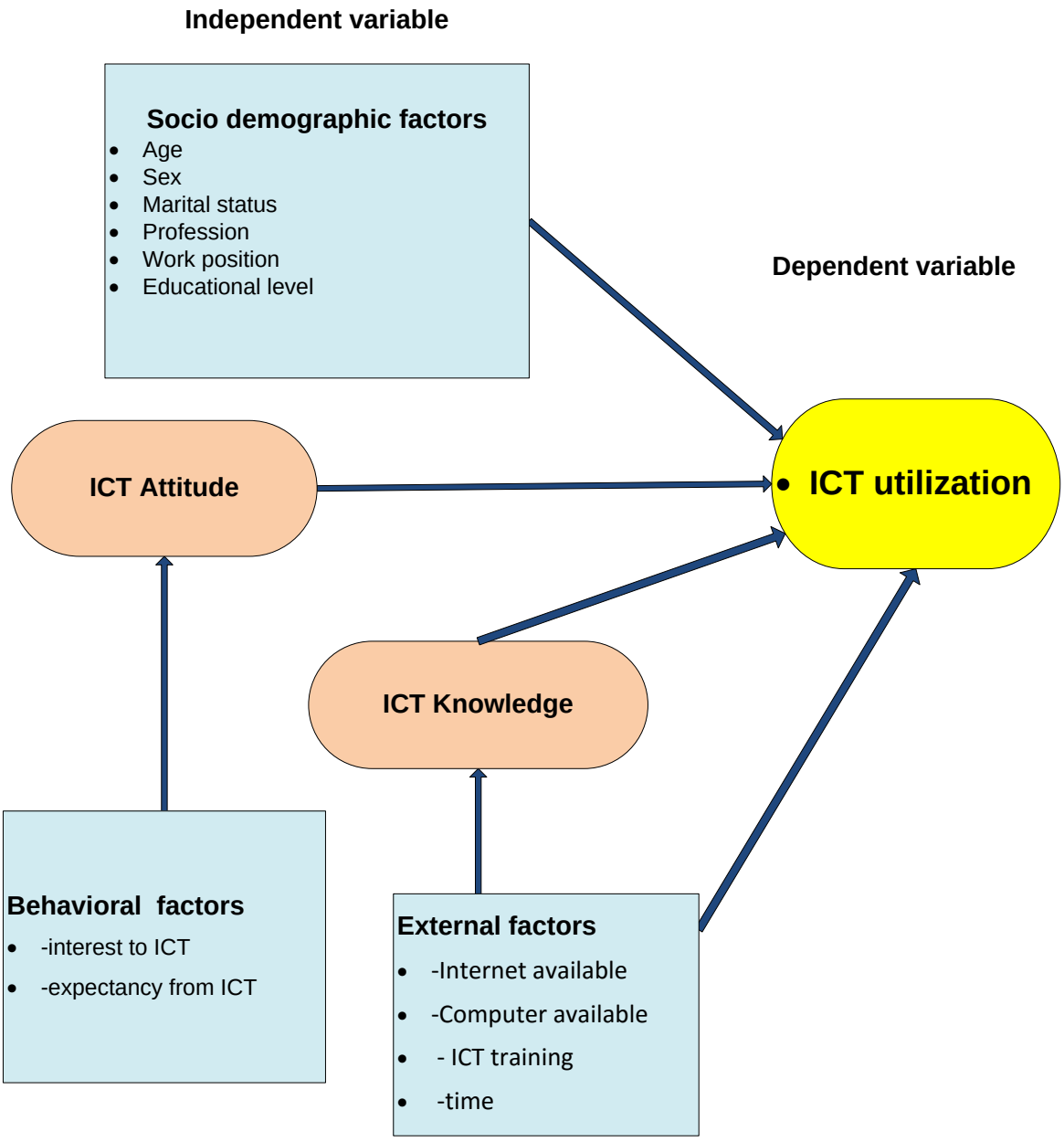


Figure 1. Conceptual framework of knowledge, attitude and utilization of ICT at university of Gondar comprehensive specialized hospital, northwest Ethiopia 2017

1.4 JUSTIFICATION

ICT would hopefully help to balance organizational proper health care delivery in the organization Several countries are known to exploit ICT in the modernization of their health sector. Its specific applications include the delivery of health services in areas such as telemedicine, health sector management, database on health information, health education, etc... For successful implementation of ICTs, first to improve telecommunication infrastructure and health professional knowledge, attitude and utilization habit of ICTs should be improved.

Some study shows that ICTs knowledge, Attitude and utilization of health professional is low. For instance, at University of Gondar comprehensive & specialized hospital there is enough access of ICT material in each and every unit. On the contrary, most of them are not properly functioning as far my observations are concerned. For that reason, university of Gondar invests huge capital for development of ICT in campuses including the hospital. Despite the fact that, it is very essential to know the current ICT knowledge, attitude and utilization habits of health professionals before its practical implementation of e-Health. Additionally, it is necessary to identify the gap and show associated factors for proper utilization of ICT in the organization.

One of the limitation of previous study in developing country (in Ethiopia) (13). Did not address the attitude of health workers towards computers. Attitude of health professionals can influence their computer knowledge and utilization. As per my knowledge, there is no adequate information on the knowledge, attitude and utilization habit of ICTs on health professionals at Gondar university comprehensive specialized hospital.

2. OBJECTIVES

2.1. General objective

To assess knowledge, attitude and utilization of Information communication technology (ICT) among health professionals at Gondar University Comprehensive Specialized Hospital, Northwest Ethiopia 2017.

2.2 Specific objectives

- To describe knowledge of ICT among health professionals.
- To identify attitude of health professional on ICT.
- To determine the associated factors ICT utilization among health professionals.

3. METHODS

3.1 Study design

An institutional based cross-sectional study was, deployed to assess health professional's ICT utilization and associated factors with utilization of ICTs at Gondar University comprehensive specialized hospital.

3.2 Study area and period

The study was, conducted at Gondar university comprehensive specialized hospital from April 15 to May 10, 2017. University of Gondar Comprehensive Specialized Hospital established by FMOH in 1954, currently one of the specialized teaching university comprehensive hospital. It is found in Amhara national regional state, North Gondar Zone, Gondar town. It is located 750 km Northwest to Addis Ababa. It served as the referral center for privet and other government hospitals in the region. It have specialties service including internal medicine, pediatrics, surgery, gynecology, optometrist, psychiatry, etc.

3.3. Source population

All health professional enrolled in human resource in University of Gondar Comprehensive Specialized Hospital.

3.4. Study population

All health professionals, who are working in the comprehensive specialized hospital during data collection period, were considered as study population.

3.5. Inclusion criteria and Exclusion criteria

3.5.1. Inclusion criteria

All healthcare professionals employed at the University of Gondar comprehensive specialized hospital.

3.5.2. Exclusion criteria

Those health professionals on annual and sick leave during sample collection period,.

3.6. Sample size determination

Sample size was determined using single population proportion formula. The proportion taken from the findings of previous study in the Harari region of Ethiopia. As shown on the table below and 95% Confidence Interval, 0.05 margin of error and 10% for non-response. Based on these assumptions the actual sample size of the study, population calculated based on the formula depicted below.

$$n = (Z_{a/2})^2 \frac{P(1-P)}{d^2}$$

Where: n = sample size

Z = (standard normal distribution curve for the 95%) or 1.96 with 95% CI

P = knowledge and utilization factor taken from the findings to previous study.

Attitude not known take 50 %. Is population proportion of Attitude toward ICT was taken 50%, this proportion was preferred due to as per my knowledge lack of similar studies in Ethiopia. Based on these assumptions the sample size was calculated and the resulting sample size were 384 participants.

Table 1. Sample size determination at university of Gondar comprehensive specialized hospital, northwest Ethiopia 2017.

Categories	**Proportion**		**Sample size (n)**
ICT knowledge	**18.7%**		**233**
Attitude to ICT	**50%**		**384**
Factor ICT utilization	**ICT training**	**27.5%**	**303**

d = precision (acceptable marginal error) = 0.05

Thus n_o = (1.96)2 0.50(1-0.50) / (0.05)2 = 384.16 ≈ 384

To reduce the sample size uses correction factor formula.

$$n = \frac{n_o}{(1 + \frac{n_o}{population})},$$

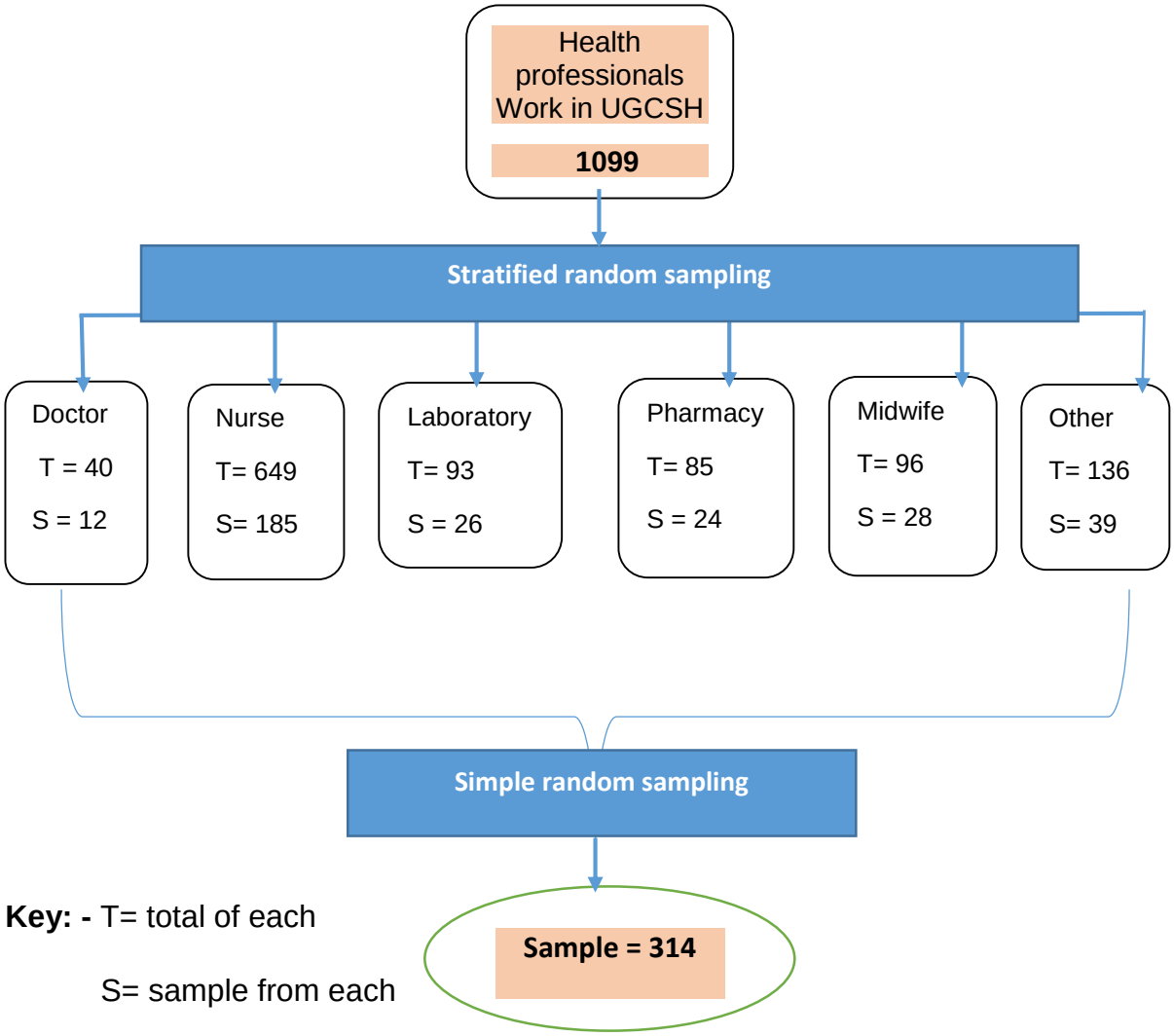
Where: • N = is the size of the source population = 1099

$$n = \frac{n*N}{n+N} = \frac{384x1099}{384+1099} = 284.56 \approx 285$$

Non-response rate = 10% * 285 = 29 those, Total sample size is 285+29 = **314**

3.7 Sampling procedure

Total samples of 313 subjects were selected from the participant in the study using Stratified random sampling technique since the population is not homogeneous. Proportional allocation for each subgroup was done. Study subjects from each stratum was selected using simple random sampling.



Key: - T= total of each

S= sample from each

Other = Those Health professional included - Environmental, Physiotherapy, Radiographer, Anesthesia, Ophthalmologists, Psychiatry, and Health officer.

Figure 2: Sampling Procedure of ICT utilization among health professionals at university of Gondar comprehensive specialized hospital.

3.8. Data Collection Procedure

Data collection was done using semi-structured, self-administered questionnaire. The questionnaire contains four parts. Socio-demography, knowledge, attitude and utilization habit of the health professionals. The questionnaire was prepared to fill in English. Pre-test was done on 5% (16) health professionals at Debark district hospital before two week the actual data collected. Two supervisors and six facilitators were participated in the data collection process. Before distributing the questionnaire, informed to hospital‘s administrator about the study by means of ethical clearance form from GUIPH that briefly stated the purpose of the study and its significance. Then the questionnaires sent to each facilitator. After getting full permission from each selected participant, start data gathered using the self-administered questionnaire. Ensure completeness and consistency of the collected questionnaire. The data collection was, conducted for 15 days in consideration week off and night off program of the facility of from April 15 - May 10, 2017.

3.9. Data quality

The principal investigator gave training how to distribute and collect the questionnaire. supervises the overall quality of data collection process and also the investigator was together with the data collectors in almost all the time during the data collection processes. While filling the excel manual extraction format part of the data was checked by crosschecking the electronic based data sets with the paper based documents and check out for matches and also many of the manually filled documents were cross checked for their similarity and consistency with the electronic data sets.

3.10. Variables of the study

3.10.1. Dependent variable (outcome variable)

- ICT Utilization

3.10.2. Independent variable

- Socio demographic characteristics, Age, Sex, Marital Status, Educational Level, Profession, Department etc.
- ICT training
- Internet available
- Time
- ICT knowledge
- ICT attitude

3.11. OPERATIONAL DEFINITIONS

Information Communication Technology (ICT)

Information and communication technology (ICT) is often used as an extended synonym for information technology It is a more specific term that stresses the role of unified communications and the integration of communications. It comprises of computing technology, the Internet and other accessories which enable users to access, store, transmit, and manipulate information(1).

ICT Knowledge:

Health professionals familiarity and awareness to use digital technology, communication tools, or to define, access, manage, integrate, evaluate, create, and communicate information ethically and legally in order to function, regarding knowledge of their general computer skill. (such as the skill to manage files, install hardware, install software, use of CD-writer), word possessing (being able to start a new document, save, edit, format, insert pictures and tables), data handling (knowing how to use sent report point), information services. Classify health professional ICT knowledge after adopting a cut of value from the Nigerian study in 2004 on the same topic (11). Those scoring 80% or above on the knowledge test were rated as having good computer knowledge; those scoring below 80% were rated as having poor computer knowledge.

Attitude towards ICT:

Health professionals intention to use ICT, their perceived social pressure to interact with ICT, their perceived control over their capacity to interact with ICT and their beliefs and expectations about the various factors that potentially assist or hinder their use of ICTs and their five perceived attributes (strongly disagree, disagree, neither, agree, and strongly agree.) After checking symmetric normality assumption decide Respondents whose score **greater than or equal to mean value** is considered as positive attitude and **below mean** value is considered as negative attitude.

ICT Utilization:

ICT utilization consists of ICT facilities (availability of computer at the work place, availability of Internet in the organization or use of technologies or tools at the health facilities that includes computer software and hardware, and internet in order to access, communicate, explore and share information). In this study, ICT utilization was adopting a cut of value from the Nigerian study in 2004 on the same topic (11). Health professionals who scored 60% or above on the utilization test well as having good computer utilization, while those scoring below 60% well rated as having poor computer utilization.

3.12. DATA PROCESSING AND ANALYSIS

The data checked for accuracy, consistencies, missed values and variables. Any logical and consistency error identified during data entry was corrected after revision of the original completed questionnaire. The cleaned and edited data was entered in to EPI INFO version 7 and export to SPSS version 20 for further analysis. Frequency tables, proportions and crosstabs was used for the descriptive analysis. Logistic regression was performed to assess the association between binary outcomes (ICT Utilization) and different explanatory variables. Bivariate analysis was first conducted for each potentially explanatory variable. Variables that satisfied that satisfied p-value < 0.05 p-value < 0.05 was selected for further analysis using multiple logistic regression models. The strength of association was interpreted using odds ratio (OR) and 95%confidence interval (CI) P-value < 0.05 was considered statistically significant in this study.

3.13. ETHICAL CONSIDERATION

Ethical clearance obtained from ethical review Board of university of Gondar. A formal letter of permission obtained from Gondar university comprehensive specialized hospital medical director. Informed consent obtained from participants and confidentiality was maintained by omitting their personal identification and keeping of the respondents' anonymous.

4. RESULTS

Socio demographic characteristics health professionals

A total of 314 participants were enrolled in the study giving an overall response rate of 94.9%. The mean age of the study participants was 28.6 (±4.4) years. Male constitute only 159 (53.4%) of the respondents. The majority 180(60.0%) were Nurses. Almost half of the respondents 159 (53.4%) were single, 256 (85.9%) were Orthodox Christians and 238(79.9%) were BSc holders.

Table 2. Socio demographic characteristics of health professionals at university of Gondar comprehensive specialized hospital, 2017 (n = 298)

Variables	**Category**	**Frequency (%)**
Age	20-25	43 (14.4%)
	25-30	153 (51.3%)
	≥30	102 (34.2%)
Sex	Male	159 (53.4%)
	Female	139 (46.6%)
Marital Statues	**Single**	159 (53.4%)
	Married	131 (44%)
	Divorced	8 (2.7%)
Religion	Orthodox	256 (85.9%)
	Muslim	27 (9.1%)
	Protestant	12 (4%)
	Catholic	3 (1%)
Profession	Doctor	12 (4%)
	Nurse	180 (60%)

	Laboratory	26 (8.7%)
	Pharmacy	19 (6.4%)
	Midwifery	25 (8.4%)
	Other **	36 (12.1%)
Educational Status	MSc	34 (11.4%)
	BSc	238 (79.9%)
	Diploma and below	26 (8.7%)
Service In Year	≤ 5 years	175 (58.7%)
	5 -10 years	96(32.2%)
	10 -15 years	12(4%)
	≥ 15 years	14 (4.7%)

Health professional's knowledge on ICT

It was shown from the study that 240 (80.5%) of the respondents had good ICT knowledge. Of which 132 (51%) were female. 255(85.5%) of the respondents correctly answered which is a global communication network is internet. 237(79.5%) responded that printer is an output device. 222(74.5%) knew a computer network is an interconnected of computers located in different places. Most of knowledge measuring question answered correctly by respondents was 264(88.5%) know medical websites for professional updates 'from those 53(42.7%) Pub Med, 46(37.4%) MEDLINE and most of them including those 116 (94%) MED up-to-date. Other finding in the table below.

Table 3: knowledge of ICT among health professionals at university of Gondar comprehensive specialized hospital,

Characteristic or feature	**Knowledgeable to ICT**	
	N	**%**
The global communication network is called Internet.	255	85.5
A network is an interconnected of computers located in different places.	222	74.5
Do you know any specialized medical websites for professional updates?	264	88.5
Message sent by e-mail to deliver every PC network instantly.	236	79.1
Networks allows the different PCs to access the same files.	250	83.8
Computers only understand the series of 1's and 0's?	218	73.2
The CPU is hardware.	273	91.6
E-Mail is short for electronic mail.	213	71.4
Application software is an operating systems which control the workings of the computer	244	81.8
The term input refers to the set of instructions that directs the hardware in a computer to accomplish a task	223	74.8
RAM refers to read only memory.	239	80.2

A modem allows computers to communicate using telephone line.	246	82.5
Printer is an output device, which produces output on paper.	237	79.5

Health professionals Attitudes toward on ICT

One hundred sixty two (54.4%)) of the respondent had positive attitude to ICT, of which 89 (55%) were female, and 103 (64%) were nurses. In addition, these educational status (BSc & above 149(44.7%), Diploma & below 13 (56.3%). The result of the study indicated that from the total of respondents 224 (75%) believe work with computer develop my knowledge and 182(61%) believe ICT appropriate for my profession in all aspect, 'Do you agree that it is feasible to acquire computer and internet for your hospital?' 156 (52.3%), Health professionals interest to know more for ICT 107(36%).

Despite the fact that which they think using computerized patient management system more important than paper based system 178 (59.7%). As the same time majority of the health, professionals believe that ICTs can help increase quality of patient care 186 (62.4%), And 164(55 %) of the respondents point out that felt confident when working with computers.

Table 4. Health professionals Attitude toward ICT at University of Gondar comprehensive specialized Hospital, 2017 (n = 298

Characteristic or feature	Positive Attitude toward ICT	
	N	%
I believe I could do advanced computer work.	216	72.4
I believe I could do work with computer develop n knowledge.	224	75
I feel confident when working with computers.	164	55
I feel bad if a conversation turns to computers.	50	16.7
I would generally feel OK trying something new on computer.	196	65.7

I avoid using computers whenever I can	61	20.4
Do you agree that it is feasible to acquire computer ar internet for your hospital?	156	52.3
Do you agree with that using computerized patie management system more important than paper base system?	178	59.7
I think using of ICTs can help increase quality of patie care.	186	62.4

Factors associated with health professional's ICT utilization

The result of the study indicated that from the total of respondents 119 (39.9%) had good ICT utilization habit. of whom 87 (73%), 75(63%), &74(62%) were educational level is BSc, good knowledge, and positive Attitude respectively other values.

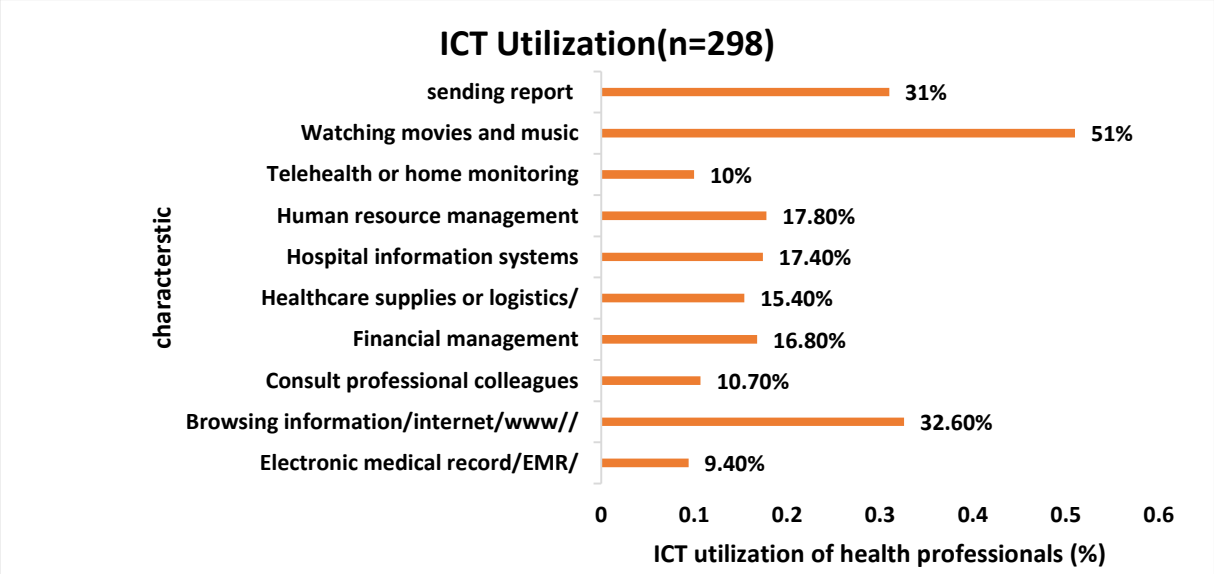


Fig 3. ICT Utilization of health professionals at University of Gondar Comprehensive specialized Hospital, 2017 (n = 298).

As indicated below in the table after bivariate logistic regression analysis of each independent variable to dependent variable with p- values less or equal to 0.2, was

fitted to multiple logistic regression for further analysis between independent and dependent variables and p –value less than 0.05 was taken as significant.

In multiple logistic regression those independent variables; Age, Educational Status, ICT Training and ICT Knowledge had statistically significant association with ICT Utilization.

Health professionals who had younger age group (20-25 years) were approximately 4.29 times more likely to utilize ICT as compared to health professionals age group 30 years and older [AOR:4.289. 95% CI (4.289-5.37)]. Additionally health professionals those with masters were 7.568 times more likely to utilize ICT than those with diploma and below health professionals [AOR: 7.568, 95%CI ;(2.047-27.976)]. Health professionals. Who had good knowledge 9.06 times more likely to utilize ICT than who had poor knowledge [AOR: 9.06, 95% CI;(4.014-20.207)] health professionals those health professionals who had previous ICT training were 4.924 times more likely to utilize ICT than those who did not have any kind of ICT training [AOR:4.924,95%CI;(2.762-8.776)]. The results shown in Table 4.

Table 5. Bivariate and multivariate logistic regression analysis ICT Utilization at university of Gondar comprehensive specialized hospital, 2017 (n = 298)

Predictors variable		**Utilization**		**COR (95% CI)**	**AOR (95% CI)**
		Good	**Poor**		
Age	20-25	25	18	2.546(1.228-5.280)*	**4.289(1.781- 10.329)***
	25- 30	58	95	1.119(0.665-1.855)	1.341(0.717-2.506)
	≥30	36	66	1.00	1.00
Sex	Male	61	98	1.00	1.00
	Female	58	81	(0.546- 1.385)	0.731(0.430- 1.244)
Marital status	Single	65	94	(0.266- 4.992)	1.424(0.258-7.861)
	Ever Married	54	85	1.00	1.00
Profession	Doctor	11	1	2.800(0.711- 11.030)	1.796(0.390-8.278)
	Nurse	63	117	0.754(0.363- 1.564)	0.660(0.278-1.566)

Laboratory	15	21	1.200(0.434- 3.854)	1.079(0.137-8.524)
Pharmacy	12	14	1.260(0.412- 3.854)	0.582(0.60- 5.664)
Midwife	9	10	1.292(0.463- 3.609)	1.411(0.451- 4.417)
Other**	20	17	1.00	1.00
Work position Health provider	101	164	7.000(1.386- 35.345)	1.851(0.484-7.078)
Department head	18	15	1.00	1.00
Education status MSc	25	9	7.540(2.378-23.904)*	**7.568(2.047-27.976)***
BSc	87	11	1.564(0.632-3.869)	1.552(0.563-4.278)
Diploma & below	7	19	1.00	1.00
Department Inpatient	2	6	1.00	1.00
Out patient	30	56	1.667(0.312- 8.892)	1.268(0.166-9.715)
Emergency	56	84	1.339(0.245- 7.322)	1.059(0.141- 7.980)
Pharmacy	9	10	2.500(0.397-15.749)	2.268(0.254-20.236)
Laboratory	11	12	2.250(0.346- 14.611)	1.713(0.92-31.830)
Other	11	11	2.292(0,367- 14.323)	1.956(0.116-32.855)
ICT training Yes	49	136	4.518(2.378-7.456)*	**4.924(2.762-8.779)***
No	70	43	1.00	1.00
Knowledge Poor	44	14	1.00	1.00
Good	75	165	6.914(3.572- 13.384)*	**9.006(4.014-20.207)***
Attitude Positive	74	88	1.000	1.00
Negative	45	91	1.701(1.060- 2.727)	1.267(0.687- 2.335)

** P-value < 0.05 significantly associated*

*** Other = Those Health professional included - Environmental, Physiotherapy, Radiographer, Anesthesia, Ophthalmologists, Psychiatry, and Health officer*

5. DISCUSSION

Out of 314 respondents in this study ICT, utilization habit of health professionals was 39.9% with 95% CI; (34.2%, 45.6%). The result was higher than study conducted in Addis Ababa Ethiopia (19.3%) (8). and Harare Ethiopia (29.5%) (13). this variation might be due to the difference in study years and area. Since study participants in my study includes higher education level health professional staff compared with Harare study. It might be also attributed to a difference in study participants between the studies; previous studies included health professionals working at the health centers, which have less computer access and information communication technology infrastructure.

The study conducted in Kenya 27.6% of the health professionals was good ICT utilization (21).compare with my study lower utilization habit of ICT. This variation is might be due to difference in study time and area.

The current study result was similar with study conducted in Nigeria (39.8%) (20).However the result of this study was lower than the study conducted in Austria 75 % (18), Texas 81% (19), United States 91% (16).and Belgium (93%) at general acute care hospital and 94% at psychiatric hospital working health professional is good ICT utilization habit (17).These differences might be attributed to the infrastructure and economical status of the countries.

The proportion of knowledge among health professionals towards ICT was 80.5% with 95% CI; (75.8%, 84.9%). In this study participants with good knowledge had 9 times utilize ICT as compared with their counter parts with [AOR]= 9.01; 95% CI (4.014-20.207)*. This might be due to understand benefit of ICT to professionals daily activates.

Participant with age group 20-25 years was 4 times with AOR 4.29(1.781- 10.329)* utilize ICT compared to older age group which is relatively similar with the study conducted Harare Ethiopia. Health professionals with advanced levels of education showed significantly better ICT utilization than educational status on middle-level health professionals (13). Finding of this study was inconsistent with studies in India that showed that level of education was not significantly associated with ICT utilization

(15). This may be due to training differences for health professionals in India and Ethiopia in which the basic computer courses in Ethiopia are more theoretical with few hours of practical lessons.

Participants with ICT trained was 4.9 times with AOR 4.924(2.762-8.779)*compared with health professionals who had not trained. The result was consistent with previous study in Ethiopia and India (13, 15).

Health professionals ta University of Gondar comprehensive specialized hospital daily utilization of ICT for different purpose in the hospital the result of this study lower than the study in Kenya(15).

6. LIMITATION OF THE STUDY

This study not supported by qualitative study the information collected from each participant self-perceived, which might have reporting bias to utilization habit of ICTs. Future studies including actual practical use assessment were recommend. Additionally, the study used cross sectional; it does not show cause and effect relationship.

7. CONCLUSION

The results of this study have important implications for the knowledge, Attitude and utilization status of health professionals in the health facilities. The study indicated that majority of the health professionals had low level of ICT utilization and most of them are high level of ICT knowledge. Half of the respondents have positive attitude toward ICT, however those who had positive attitude consistent from those who had negative attitude toward good utilization rate of ICT.

The study revealed high number of health professions was knowledgeable to ICT however low utilization of ICT among the health care professionals. The fact that ICT knowledge be relevant to ICT utilization.

The younger age groups and increment educational level by itself had more likely to have better utilization of ICT applications compared to older ages and low educational level of health professionals. younger age group is more diff

The small proportion of the health care providers who had received ICT training among the health professionals this. Trained in ICT were mostly trained before joining the health service a fact that show training receive relevant to ICT utilization. ICT training among the health care providers relatively low proportion of the respondents recognized the benefits accrued from ICT utilization in the health care system. Despite the infrastructure development in the health facilities, lack of ICT facilities majored as the main reason that hampered ICT utilization among the healthcare providers. The study further revealed there is limited available ICT facilities which may cause delay in service provision or result to low utilization rate and further damage to the available ICT facilities.

8. RECOMMENDATION

To University of Gondar comprehensive specialized hospital need to be intervene to build capacity of healthcare providers on ICT utilization for effective and efficient ICT usage in order to improve the healthcare service provision in the organization.

University of Gondar comprehensive specialized hospital create more education continuation chance to health professions this by itself great contribution to good ICT utilization habit of the professions.

This result implies that providing trainings not only about the specific software going to be implemented but must also generally about ICT can make a significance difference in ICT utilization habit of health professionals. Additionally ICT trainings more focus on practical skill session

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10. ANNEXES I

Self-administer questionnaire

Questionnaire for assessment of health workers knowledge, attitude and utilization of information, communication technology (ICT) at Gondar university referral hospital

Informed consent

I am Ato Temesgen Belay who is doing a research as partial fulfillment for the requirement of master of public health, in health informatics at University of Gondar College of medicine and health sciences institute of public health. I would like to ask you few questions about our knowledge, attitude and utilization on information communication technology that will help to improve information communication technology implementation. You have been selected to participate in this study by chance and your anonymous answers used only for research purpose. The result of the study benefits the management and the hospital by producing relevant information on the current level of knowledge, attitude and utilization habit of the staff. In order to attain the purpose of the research effectively, I request you to give genuine response to each question. There are questions for you to complete and there is no need to put your name on the questionnaire; no individual responses was reported. Your answers are completely confidential. It is your full right to refuse, to answer any or all of the questions. If you don't want to participate you can leave the questionnaire empty. However, your honest response to these questions will help us achieve the objective of this study

I understand that the findings of this research will be disseminated to Hospital management and decision makers that was useful as an input for design .

I voluntarily participate in this study. I agree ☐

I disagree ☐

If you are agreeable to participate in the study, please visit the next page. For any further question, contact the investigator

Thank you for consenting to be a participant in this study.

For Data collectors use only:

Profession: _____ Questionnaire ID: _____

Section I: Socio demographic characteristics answer the given question by circle the number

S №	Questions	Possible answer	Code
101	Age in year	_____	
102	Sex	1. Male 2. female	
103	Marital states	1. Single 2. Married 3. Divorced 4. Widowed 5. Separated	
104	Religion	1. Orthodox 2. Muslim 3. Protestant 4. Catholic 5. If Other, specify_____	
105	Profession	1. Doctor 2. Nurse 3. Lab. Tech. 4. Phar. Tech 5.midwifery 6.Other:specify_____	
106	Educational status	1. Specialist 2. MSc 3. BSc 4. Diploma 5. Certificate	

107	What is your work position?	1.Health care provider 2.Department/team leader 3.Head of institution 4.Other:specify_____	
108	At which department do you work?	1. Inpatient 2. Out patient 3.emergency 4.pharmacy 5.labratory 6.other:specify_____	
109	What is your total year of services in years?	1. <5 years 2. 2. 5-10 years 3. 10-15 years 4. 4. >15 years	
110	Have you had any formal training in ICTs?	1. Yes 2. No	
111	If yes for the above question what type of ICTs training, do you have?	1. Short term on job training from office 2. Short-term training at training center 3. Formal training at university or college 4. Personal/effort/informal training 5. others: specify_____	
112	Do you have internet access in your organization?	1. Yes 2. No	

Section II: knowledge of ICT assessment questionnaire *Answer the given question by circle the number*

200	Do you have computer in organization	1. Yes 2. No	
201	The global communication network is called Internet.	1. Yes 2. No 3. I don't know	
202	A computer network is an interconnected of computers located in different places.	1. Yes 2. No 3. I don't know	

203	Do you know any specialized medical websites for professional updates? if say No, Go to question #205	1. Yes 2. No 3. I don't know	
204	If you say Yes, above question Which web source are you aware?	1. Pub Med 2. MEDLINE 3.Pop line 4. Cochrane 5. HINARI 6. I don't remember 7. Other	
205	Message sent by e-mail to deliver every PC network instantly.	1. Yes 2. No 3. I don't know	
206	Networks allows the different PCs to access the same files.	1. Yes 2. No 3. I don't know	
207	Computers only understand the series of 1's and 0's?	1. Yes 2. No 3. I don't know	
208	The CPU is hardware.	1. Yes 2. No 3. I don't know	
209	Application software is an operating systems which control the workings of the computer	1. Yes 2. No 3. I don't know	
210	E-Mail is short for electronic mail.	1. Yes 2. No 3. I don't know	
211	The term input refers to the set of instructions that directs the hardware in a computer to accomplish a task	1. Yes 2. No 3. I don't know	
212	RAM refers to read only memory.	1. Yes 2. No 3. I don't know	
213	A modem allows computers to communicate using telephone line.	1. Yes 2. No 3. I don't know	
214	Printer is an output device, which produces output on paper.	1. Yes 2. No 3. I don't know	

Section III. Attitude measuring questionnaires *I will ask you a few questions about attitude towards ICT You will answer by √ the number*

S. N	Variables	**Level of attitude**				
		Strongly disagree	Dis agree	Neither	Agree	Strong agree
301	I believe I could do advanced computer work.	1□	2□	3□	4□	5□
302	I believe I could do work with computer develop my knowledge.	1□	2□	3□	4□	5□
303	Figuring out computer problems interesting to me.	1□	2□	3□	4□	5□
304	I feel confident when working with computers.	1□	2□	3□	4□	5□
305	I feel intimidated if a conversation turns to computers.	1□	2□	3□	4□	5□
306	I would generally feel OK trying something new on a computer.	1□	2□	3□	4□	5□
307	I avoid using computers whenever I can	1□	2□	3□	4□	5□
308	Do you agree that it is feasible to acquire computer and internet for your hospital?	1□	2□	3□	4□	5□
309	Do you agree with that using computerized patient management system more important than paper based system?	1□	2□	3□	4□	5□
310	I think using of ICTs can help increase quality of patient care.	1□	2□	3□	4□	5□

Section IV. ICT Utilization measuring questionnaires *answer the given question by circle the number*

S.N	**Variable**	**Possible answer**
401	Do you have computer	1.Yes 2.No
402	Internet access in the organization	1. Yes 2. No
403	Do you use the internet if say No, Go to question # 408	1. Yes 2. No
404	If the question # 401 is yes, for what purpose do you use it?	1. E-Mail 2. Research 3. Entertainment 4. Scholarship 5. Telemedicine 6. Others specify_____
405	Which search engines do you use?	1. Google 2. Yahoo 3. Both 4. None of them
406	Where do you use the internet?	1. Hospital (work place) 2. Home 3. Internet café/hotspot 4. Through Phone 5. Other, please state _____
407	Do you have an e-mail address?	1. Yes 2. No
408	How many hours you spend on the computer per day?	**----------**
409	What are the main modes of communication do you use? (Multiple answer is possible)	1. Email 2. Internet 3. cell phone 4. Videophones 5. video conferencing 6. Others, please specify _____
410	What are your reasons for not using the internet?	1. I don't have access to computer 2.I don't have access to internet

		3.I don't have time to brows 4. High cost of internet 5. I am not interest 6. Other, please state _____
411	Do you intend to use the internet in the future?	1. Yes 2. No
412	For what tasks you use computer. (Multiple answers is possible)	1. Word processing 2. Spreadsheets (MS-excel) 3. Manages medical instruments 4. Manage patient data 5. Browse the internet for information 6 Others,

What are the main utilization of ICTs you using in your work? Please, tick (√) on the frequency column

S.No	ICTs application used in the hospital	Frequency of use		
		Never	Rarely	Always
411	Electronic medical record/EMR/	1□	2□	3□
412	Browsing information/internet/www/	1□	2□	3□
413	Consult professional colleagues	1□	2□	3□
414	Financial management	1□	2□	3□
415	Health education	1□	2□	3□
416	Healthcare supplies or logistics/	1□	2□	3□
417	Hospital information systems	1□	2□	3□
418	Human resource management	1□	2□	3□
419	Telehealth or home monitoring	1□	2□	3□
420	Word processing	1□	2□	3□

11. ANNEX II

Information and consent sheet

Information and consent sheet prepared for health professionals who are going to participate in this research project. Assessment of knowledge, attitude and utilization of information communication technology at Gondar university comprehensive specialized hospital. Gondar Northwestern Ethiopia.

Name of the investigator: Temesgen belay

Name of the organization: Gondar university comprehensive specialized hospital,

Name of the sponsor: University of Gondar

Introduction: this information sheet and consent form is prepared to explain the study you are being, asked to join. Please listen carefully and ask any question about the study before you agree to join. You may ask question at any time after joining the study.

Purpose of research project: the purpose of this research is to assess knowledge, attitude and utilization of information communication technology at Gondar university comprehensive specialized hospital in Gondar. The study was useful in determining the current level of knowledge, attitude and utilization of information communication and technology in the health faculty.

Procedure: To assess health professional knowledge, attitude and utilization of information communication technology, we invite you to take part in this project. If you are willing to participate in this project, you need to understand and sign the agreement form. Then after, you was, interviewed by the data collector to give your response. You do not need to tell you name to the data collector and all your responses and the results obtained was, kept confidentially by using coding system whereby no one will have access to your response.

Risk/discomfort: By participate in the research project you may feel that it has discomfort especially on wasting time about 30 minutes. I hope you will participate in the study for the sake of the benefit of the research result. There is no risk in participating in this research project.

Benefits: if you participate in this research project, there may not be direct benefit to you but your participation is likely to help us in assessing the knowledge, attitude and utilization of information communication technology of health professionals.

Incentives: you will not be, provided any incentives or payment to take part in this project.

Confidentiality: the information collected from this research project was, kept confidential and information about you that was, collected by this study was stored in a file without your name, but a code number assigned to it. In addition, it will not be revealed to anyone except the participate investigator and was kept locked with key.

Right to refuse: you have full right to refuse from participating in this research. You can choose not to respond to some or all question if you don't want to give your response. You have also the full right to with draw from this study at any time you wish, without losing any of your right.

1. Person to contact Temesgen Belay

   Email: - temesgenbelay95@yahoo.com

   Mobile No - 0918810056/ 0918149696

2. Adviser 2.1 Solomon Assefa

   Email: - Solomonazezo@gmail.com

   2.2 Kassahun Dessie

   Email: - kassahundessie@gmail.com

12. DECLARATION

I, the undersigned, MPH-HI student declare that this thesis is my original work in partial fulfillment of the requirement for the degree of Master of Public Health.

Name: Temesgen Belay

Signature: _____

Place of submission: institute of Public Health, College of medicine and Health Sciences, University of Gondar.

Date of Submission: _____

This thesis work submitted for examination with my/our approval as university advisor(s).

Advisors	Name	Signature
Mr. Solomon Assefa	(BSc, MPH)	_____
Mr. Kassahun Dessie	(BSc, MPH)	_____